

CLAIMS

It is claimed:

1. A control for an injector, comprising an energizing device actuated by a fluid pressure during an injection event to provide a monitoring voltage.

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2. The control for an injector of claim 1, wherein the monitoring voltage is associated with an applied opening current.

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3. The control for an injector of claim 1, wherein the monitoring voltage is associated with a start of an injection event.

4. The control for an injector of claim 1, wherein the monitoring voltage is associated with a feedback control signal.

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5. The control for an injector of claim 1, wherein the monitoring voltage is associated with a duration of an injection event.

6. The control for an injector of claim 1, wherein the monitoring voltage includes a plurality of voltages, comprising:

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a first voltage associated with an applied opening current;

a second voltage associated with a start of an injection event;

a third voltage associated with a feedback control signal;

a fourth voltage a duration of an injection event; and
a fifth voltage associated with an end of an injection event, wherein
the first voltage is greater than the second voltage,
the second voltage is greater than the third voltage,
5 the third voltage is greater than the forth voltage, and
the fourth voltage is less than the second voltage.

7. The control for an injector of claim 1, wherein the energized device is
a piezoelectric actuator.

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8. The control for an injector of claim 7, wherein the piezoelectric
actuator is energized by a feedback piston.

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9. The control for an injector of claim 1, wherein the fluid pressure is
provided by an inlet rail during an injection event.

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10. The control for an injector of claim 1, wherein the energized device is
a piezoelectric actuator energized by a feedback piston which is moveable between a
first position and a second position such that in the second position, the feedback
piston contacts a plate of the piezoelectric actuator to generate the monitoring
voltage.

11. The control for an injector of claim 10, wherein the feedback piston is moved from a first position to a second position with fluid provided from a working port.

5 12. The control for an injector of claim 11, wherein the monitoring voltage is provided to a controlling means for controlling an opening and closing time of a spool of an injector via an actuating plate.

10 13. A control valve for an injector, comprising:
a control valve body having a bore and a plurality of fluid connections;
a spool valve assembly moveable within the bore between a first position and a second position, the spool valve assembly having a first hydraulic surface and a second opposing hydraulic surface in fluid communication with a first fluid connection and a second fluid connection, respectively, of the plurality of fluid connections; and
15 an actuator having a fluid connection between ambient and the second hydraulic surface of the spool valve assembly, the actuator being sensitive to a spool valve opening via at least one of fluid pressure or mechanical pressure.

20 14. The control valve of claim 13, wherein the actuator includes a check plate which is moveable between an open position and a closed position upon an application of current.

15. The control valve of claim 14, wherein the check valve generates a voltage upon the opening of the spool valve.

5 16. The control valve of claim 15, further comprising a feedback piston in communication with a check plate and working fluid for initiating the voltage.

17. The control valve of claim 16, wherein the feedback piston is movable from a first position upon opening of the spool valve assembly.

10 18. The control valve of claim 13, further comprises a controller to monitor an injection event via the actuator and to control the opening and closing of the spool valve of the spool valve assembly based on the voltage generated by a check plate of the actuator in response to the opening of the spool valve.

15 19. The control valve of claim 18, wherein the controller utilizes a feedback control loop to adjust an injection event.

20 20. The control valve of claim 19, wherein the controller senses the feedback piston contacting the check plate via a generated voltage.

21. A fuel injector, comprising:

an intensification body including a bore having a plunger and piston assembly biased in a first direction by a first spring and an intensifier chamber for pressurizing fuel;

a nozzle assembly in communication with the intensification body, the nozzle assembly including a needle valve system biased by a second spring to block injection ports and including a hydraulic surface to raise the needle valve away from the injection ports during an injection event; and

a control valve assembly in communication with the intensification body, the control valve assembly including a control valve body having a bore and a plurality of fluid connections, a spool valve assembly moveable within the bore and having a first hydraulic surface and a second opposing hydraulic surface in fluid communication with a first fluid connection and a second fluid connection, respectively, an actuator in fluid connection between ambient and the second hydraulic surface of the spool valve assembly, and an energizing device actuated by a fluid pressure during an injection event to provide a monitoring voltage.

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